

REMARKS

Applicants thank the Examiners for courtesies extended in an interview at the USPTO on July 15, 2003.

During the interview Inventor and Attorney Joseph Bach ("Bach") discussed with the Examiner and her Supervisor the patentability of the claims in view of the cited art. More specifically, with respect to the claimed feature of "mini-environment," Bach noted that none of the cited art discloses such a feature which enables separating a minicolumn from a main vacuum chamber. However, the Examiner pointed out that the claims do not specifically delineate a capability to separate the minicolumn environment from the main vacuum chamber. Accordingly, Bach proposed to more specifically recite this capability.

Another specific feature discussed was that of the use of a turntable rather than a conventional X-Y stage. The Examiner relied on U.S. Patent No. 4,058,731 issued to Mueller et al. to demonstrate this feature. Bach contended that it would not have been obvious to incorporate the arrangement shown in Mueller et al. with the other cited references in order to arrive at the invention as claimed. However, no agreement was reached on this point.

Applicants have: (a) amended claims 1, 7-11, 13-15, 18, 21, and 24; (b) canceled claim 12; and (c) added claim 33 to clarify language and to define the present invention more clearly. Applicants respectfully submit that these amendments place the case in condition for allowance.

Examiner rejected claim 32 under 35 U.S.C. 112, second paragraph. In particular, the Examiner stated:

Claim 32 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 32 depends from claim 7, which requires said minicolumn to be nontranslatably positioned within said main chamber. Therefore, the additional limitation "wherein the tilt is variable" renders claim 32 indefinite. Since, varying the tilt of said minicolumn would contradict said mini-column being non-translatably positioned as required in claim 7.

Applicants have amended claim 7 to make clear that the minicolumn is non-translatably mounted on a mounting arm. As such, the limitation of claim 32 "wherein the tilt is variable" does not contradict the limitation of claim 7. In light of the above, Applicants respectfully request that the Examiner withdraw this rejection.

Examiner rejected claims 1, 5-6, 18, 21 and 27-30 under 35 U.S.C. 103(a). In particular, the Examiner stated:

Claims 1, 5-6, 18, 21 and 27-30 are rejected under 35 U.S.C. 103(a) as unpatentable over US Pat No. 5,399,860 issued to Miyoshi et al. and in view of JP Document 40411684 issued to Ito et al.

Miyoshi et al. teaches an electron microscope having a main vacuum chamber (40) housing a stage (42) therein.

Miyoshi et al. teaches a minicolumn (10) positioned inside said main chamber (40) (col. 6, lines 37-68; fig. 3). Miyoshi et al. teaches said minicolumn (10) having a mini-environment defined housing (10a) (see col. 4, lines 38-45).

Miyoshi et al. does not teach a load lock for loading a specimen into said main chamber.

However, Ito et al. teaches a main vacuum chamber (14) housing stage (20) therein and connected to a vacuum pump (see fig. 2).

Ito et al. discloses a load lock (18) for loading a specimen into said chamber (see abstract).

It would have been obvious to an ordinary artisan to incorporate the teachings of Ito et al. into Miyoshi et al. since Ito et al. teaches the ability to easily obtain an SEM image of a cut face of a sample (see abstract).

As per claim 5, Ito et al. discloses a second chamber (18) having an associated valve for hermetically sealing the opening between the said second chamber (18) and sample chamber (14) (see fig. 2).

As per claims 27-30, Miyoshi et al. teaches mounting said minicolumn (10) to a stationary platen (52) (i.e. back plate) (col. 6, lines 50-65).

As per claims 18 and 21, Miyoshi et al. teaches a plurality of minicolumns (col. 7, lines 34-44).

Applicants have amended claims 1, 18 and 21 to clarify language and to define the present invention more clearly. As such, Applicants respectfully traverse the Examiner's rejection.

Regarding claim 1: Note that claim 1 has been amended to make clear that a mini-environment is capable of housing and isolating a minicolumn.

The Examiner has asserted that Miyoshi et al. teaches a minicolumn disposed inside a mini-environment. As support for this assertion the Examiner points to col. 4, lines 38-

45 of Miyoshi et al. Applicants respectfully submit that the Examiner is wrong, and that Miyoshi et al. does not teach or suggest a mini-environment capable of housing and isolating a minicolumn. Applicants respectfully submit that specification defines an electron column as follows at p.1, lines 19-21 "The column 50 houses the electron source and all the necessary electron optics ..." Further, the specification defines a minicolumn at p. 2, line 10 to p. 3, line 5 in conjunction with FIG. 2 as including an electron source, an aperture, and lens arrangements having a diameter and height measured in single-digit centimeters. Still further, as set forth in the specification at p. 5, line 2 to p. 7, line 10, in conjunction with FIGs. 3A, 3B, 4A, and 4B, a mini-environment is a chamber that is capable isolating the minicolumn. In light of this, Applicants respectfully submit that the Examiner is incorrect when the Examiner points to 10a in FIG. 1A of Miyoshi et al. as being a mini-environment since 10a (when 10a is properly viewed in light of the definition of a minicolumn taken from Applicants' specification, see above) is not a mini-environment but is merely a case for column 10. In fact, Miyoshi et al. itself recognizes that 10a is merely a case for electron optic column 10, see col. 4, lines 38-44. Thus, even if the Applicants were to agree with the Examiner that Miyoshi et al. discloses a minicolumn (Applicants submit that it does not), Applicants respectfully submit that Miyoshi et al. does not disclose a mini-environment, and as such, Miyoshi et al. does not disclose a mini-environment capable of housing and isolating a minicolumn.

Further, even if one were to combine the teaching of Ito et al. relating to a load lock to the teaching of Miyoshi et al., one would still not arrive at the invention of claim 1 since there is no teaching or suggestion in either Miyoshi et al. or in Ito et al. for using a mini-environment capable of housing and isolating a minicolumn.

Lastly, Applicants respectfully submit that there is no reason, suggestion, or motivation in Miyoshi et al. or in Ito et al. or anywhere else that would have led one of ordinary skill in the art to combine Miyoshi et al. and Ito et al. to provide the invention of claim 1. As evidence of a motivation to combine Miyoshi et al. and Ito et al., the Examiner stated: "It would have been obvious to an ordinary artisan to incorporate the teachings of Ito et al. into Miyoshi et al. since Ito et al. teaches the ability to easily obtain an SEM image of a cut face of a sample (see abstract)." Applicants respectfully submit that, even if Miyoshi et al. and Ito et al. were

combined in the manner set forth by the Examiner, one would not have the invention of claim 1 since there is no teaching in Miyoshi et al. or in Ito et al. or anywhere for using a mini-environment as set forth in claim 1.

As such, Applicants respectfully submit that claim 1 is patentable over Miyoshi et al. in view of Ito et al.

Regarding claim 5: Applicants respectfully submit that claim 5 depends from claim 1, and as such, Applicants respectfully submit that claim 5 is patentable over Miyoshi et al. in view of Ito et al. for the same reasons set forth above with respect to claim 1.

In addition, the Examiner cites Ito et al. as disclosing a second chamber (18) having a valve for hermetically sealing an opening between the second chamber and sample chamber (14). Note that the second chamber referred to in Ito et al. is a load lock chamber.

Applicants respectfully submit that the load lock chamber of Ito et al. is completely different from the chamber of a mini-environment of claim 5. In particular, the mini-environment of claim 5 is capable of housing and isolating a minicolumn whereas the load lock chamber of Ito et al. does not house a minicolumn or any type of column. Further, Applicants respectfully submit that even if one were to combine the teaching of Ito et al. with Miyoshi et al. one would not arrive at the invention of claim 5 since there is no teaching or suggestion in either of the references, or anywhere, for housing a column of any kind in a mini-environment. As such, Applicants respectfully submit that claim 5 is patentable over Miyoshi et al. in view of Ito et al.

Regarding claim 6: Applicants respectfully submit that claim 6 depends from claims 1 and 5, and as such, Applicants respectfully submit that claim 6 is patentable over Miyoshi et al. in view of Ito et al. for the same reasons set forth above with respect to claims 1 and 5.

In addition, Applicants respectfully submit that claim 6 requires a valve that comprises a sealing plate that is pivoted on a shaft, which shaft is capable of elevation motion. Applicants respectfully submit that neither Miyoshi et al. nor Ito et al. teaches, hints or suggests, in any manner whatsoever, a valve that comprises a sealing plate that is pivoted on a shaft, which

shaft is capable of elevation motion. As such, Applicants respectfully submit that claim 6 is patentable over Miyoshi et al. in view of Ito et al.

Regarding claim 18: Note that claim 18 has been amended to make clear that a mini-environment is capable of housing a plurality of minicolumns and is capable of isolating the minicolumns.

Applicants respectfully submit that neither Miyoshi et al. nor Ito et al. teaches or suggests in any manner whatsoever an electron microscope including a mini-environment capable of housing and isolating a plurality of minicolumns. In particular, Applicants respectfully submit that neither Miyoshi et al. nor Ito et al. teaches or suggests in any manner whatsoever using a mini-environment capable of housing and isolating even a single minicolumn, see the arguments set forth above with respect to claim 1. Lastly, Applicants respectfully submit that Miyoshi et al. does not teach a minicolumn as set forth in the specification having a diameter and height measured in single-digit centimeters since Miyoshi et al. teaches a "compact" column having a total length of not more than 200 mm (see Miyoshi et al. at col. 5, lines 24-27). As such, Applicants respectfully submit that claim 18 is patentable over Miyoshi et al. in view of Ito et al.

Regarding claim 21: Note that claim 21 has been amended to require that each of the minicolumns has a lens arrangement consisting essentially of a plurality of conducting electrodes and at least one insulator interposed between said conducting electrodes, and wherein said lens arrangement is of a diameter no larger than three centimeters and height of no more than one centimeter.

Applicants respectfully submit that Miyoshi et al. does not teach minicolumns as required by claim 21 since Miyoshi et al. teaches a "compact" column having a total length of not more than 200 mm (see Miyoshi et al. at col. 5, lines 24-27). In addition, Applicants respectfully submit that Miyoshi et al. teaches away from claim 21 which requires that a plurality of minicolumns are non-translatably positioned inside a main chamber. In particular, Miyoshi et al. teaches that an electron optical column can be weight-reduced and size-reduced so that it can be moved in a horizontal direction while a sample table is fixed or moved, see Miyoshi et al. at col.

7, lines 46-57. As such, Applicants respectfully submit that claim 21 is patentable over Miyoshi et al. in view of Ito et al.

Regarding claims 27-28: Applicants respectfully submit that claims 27 and 28 depend from claim 1, and as such, Applicants respectfully submit that claims 27 and 28 are patentable over Miyoshi et al. in view of Ito et al. for the same reasons set forth above with respect to claim 1.

The Examiner asserts that: "Miyoshi teaches mounting said minicolumn (10) to a stationary platen (52) (i.e. back plate)." However, claims 27 and 28 require the back plate to be a back plate of a mini-environment. Note that, as was set forth above in response to the rejection of claim 1, Miyoshi et al. does not disclose a mini-environment. Hence, as a consequence of this, Applicants respectfully submit that Miyoshi et al. does not disclose a back plate of a mini-environment. As such, Applicants respectfully submit that claims 27 and 28 are patentable over Miyoshi et al. in view of Ito et al.

Regarding claims 29-30: Applicants respectfully submit that claims 29 and 30 depend from claims 1 and 5, and as such, Applicants respectfully submit that claims 29 and 30 are patentable over Miyoshi et al. in view of Ito et al. for the same reasons set forth above with respect to claims 1 and 5.

The Examiner asserts that: "Miyoshi teaches mounting said minicolumn (10) to a stationary platen (52) (i.e. back plate)." However, claims 29 and 30 require the back plate to be a back plate of a mini-environment. Note that, as was set forth above in response to the rejection of claim 1, Miyoshi et al. does not disclose a mini-environment. Hence, as a consequence of this, Applicants respectfully submit that Miyoshi et al. does not disclose a back plate of a mini-environment. As such, Applicants respectfully submit that claims 29 and 30 are patentable over Miyoshi et al. in view of Ito et al.

In light of the above, Applicants respectfully request that the Examiner withdraw this rejection.

Examiner rejected claims 2-3, 8, 11, 19-20 and 22-23 under 35 U.S.C. 103(a). In particular, the Examiner stated:

Claims 2-3, 8, 11, 19-20 and 22-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyoshi et al. and Ito et al. as applied to claims 1, 7 and 21 above, and further in view of US Pat No 5,229,607 issued to Matsui et al.

The obvious combination of Miyoshi et al. and Ito et al. has been discussed except for tilted minicolumns(s); extracting a minicolumn and a bellow structure.

However, Matsui et al. discloses an additional tilt-able minicolumn situated inside a main chamber (204) (fig. 9; col. 11, lines 45-59).

In addition, Matsui et al. teaches an x-y-z mechanism for moving the minicolumn (1) and a bellow structure (109) to facilitate said movement of the minicolumn (col. 6, lines 40-58).

It would have been obvious to an ordinary skilled artisan to incorporate the teachings of Matsui et al. into the obvious combination of Miyoshi et al. and Ito et al. since Matsui et al. teaches the ability of monitoring the localized processes (col. 11, lines 38-44).

As per claim 8, Matsui et al. teaches a back plate (111) connected to SEM tube (1), which can be removed (col. 7, lines 63-67).

As per claim 11, Miyoshi et al. teaches a vacuum pump (34) situated inside said minicolumn (10) (see col. 6, lines 14-30) while Matsui et al. teaches all limitations of claim 7.

As per claim 23, Matsui et al. teaches varying the tilt (col. 11, lines 51-59).

Applicants have amended claims 8 and 11 to clarify language and to define the present invention more clearly. As such, Applicants respectfully traverse the Examiner's rejection.

Regarding claim 2: Claim 2 depends from claim 1, and Applicants respectfully submit that, as has been discussed above with respect to claim 1, neither Miyoshi et al. nor Ito et al. teaches or suggests in any manner whatsoever a mini-environment capable of housing and isolating a minicolumn. In addition, Applicants respectfully submit that, referring to FIGs. 4, 6-7, 9 and 11 of Matsui et al., Matsui et al. also does not teach a mini-environment capable of housing and isolating a minicolumn. In further addition, Applicants respectfully submit that there is no teaching, hint, or suggestion of any kind whatsoever in Miyoshi et al., in Ito et al. or in Matsui et al. to utilize mini-environment having an opening for introducing and extracting a minicolumn into and from a main chamber, respectively, as required by claim 2.

Lastly, Applicants respectfully submit that there is no reason, suggestion, or motivation in Miyoshi et al. or in Ito et al. or in Matsui et al. or anywhere else that would have

led one of ordinary skill in the art to combine Miyoshi et al. and Ito et al. and Matsui et al. to provide the invention of claim 2. As evidence of a motivation to combine Miyoshi et al. and Ito et al. and Matsui et al., the Examiner stated: "It would have been obvious to an ordinary skilled artisan to incorporate the teachings of Matsui et al. into the obvious combination of Miyoshi et al. and Ito et al. since Matsui et al. teaches the ability of monitoring the localized processes." Applicants respectfully submit that the Examiner's assertion that one of ordinary skill in the art would combine these three references is incorrect because there is no motivation to do so, and that the Examiner's assertion is merely based upon improper hindsight. However, Applicants respectfully submit that, even if Miyoshi et al. and Ito et al. and Matsui et al. were combined in the manner set forth by the Examiner, one would not have the invention of claim 2 since there is no teaching in Miyoshi et al. or Ito et al. or Matsui et al. or anywhere for using a mini-environment as set forth in claim 2.

As such, Applicants respectfully submit that claim 2 is patentable over Miyoshi et al. in view of Ito et al. and further in view of Matsui et al.

Regarding claim 3: Claim 3 depends from claim 1, and Applicants respectfully submit that, as has been discussed above with respect to claim 1, neither Miyoshi et al. nor Ito et al. teaches or suggests in any manner whatsoever a mini-environment capable of housing and isolating a minicolumn. In addition, Applicants respectfully submit that, referring to FIGs. 4, 6-7, 9 and 11 of Matsui et al., Matsui et al. also does not teach a mini-environment capable of housing and isolating a minicolumn. In further addition, Applicants respectfully submit that there is no teaching, hint, or suggestion of any kind whatsoever in Miyoshi et al., in Ito et al. or in Matsui et al. to utilize a mini-environment having an opening for introducing and extracting a minicolumn into and from a main chamber, respectively, as required by claim 3. In further addition, Applicants respectfully submit that although Matsui et al. teaches the use of a bellows to attach an SEM tube to a flange mounted at an opening of a vacuum wall, this provides no teaching or suggestion for a mini-environment that uses a bellows structure for introducing and extracting a minicolumn into and from a main chamber, respectively, as required by claim 3. In particular, this is the case because there is no teaching or suggestion in Miyoshi et al., in Ito et al. or in Matsui et al. to house a minicolumn in a mini-environment.

Lastly, Applicants respectfully submit that there is no reason, suggestion, or motivation in Miyoshi et al. or Ito et al. or Matsui et al. or anywhere else that would have led one of ordinary skill in the art to combine Miyoshi et al. and Ito et al. and Matsui et al. to provide the invention of claim 3. As evidence of a motivation to combine Miyoshi et al. and Ito et al. and Matsui et al., the Examiner stated: "It would have been obvious to an ordinary skilled artisan to incorporate the teachings of Matsui et al. into the obvious combination of Miyoshi et al. and Ito et al. since Matsui et al. teaches the ability of monitoring the localized processes." Applicants respectfully submit that the Examiner's assertion that one of ordinary skill in the art would combine these three references is incorrect because there is no motivation to do so, and the Examiner's assertion is merely based upon improper hindsight. However, Applicants respectfully submit that, even if Miyoshi et al. and Ito et al. and Matsui et al. were combined in the manner set forth by the Examiner, one would not have the invention of claim 3 since there is no teaching in Miyoshi et al. or in Ito et al. or in Matsui et al. or anywhere for using a mini-environment as set forth in claim 3.

As such, Applicants respectfully submit that claim 3 is patentable over Miyoshi et al. in view of Ito et al and further in view of Matsui et al.

Regarding claim 8: Applicants respectfully submit that claim 8 depends from claim 2, and as such, Applicants respectfully submit that claim 8 is patentable over Miyoshi et al. in view of Ito et al. and further in view of Matsui et al. for the same reasons set forth above with respect to claim 2.

Regarding claim 11: Applicants respectfully submit that Miyoshi et al. teaches away from claim 11 which requires that a minicolumn is non-translatably positioned inside a main chamber. In particular, Miyoshi et al. teaches that an electron optical column can be weight-reduced and size-reduced so that it can be moved in a horizontal direction while a sample table is fixed or moved, see Miyoshi et al. at col. 6, lines 24-30; col. 6, line 62 to col. 7, line 2; and col. 7, lines 46-57. In addition, although Miyoshi et al teaches a vacuum pump situated inside a column, Applicants respectfully submit that this is irrelevant since claim 11 requires that the vacuum pump be situated inside the main vacuum chamber but external to the minicolumn. As the Examiner can readily appreciate, placement of the vacuum pump inside a column in

accordance with the teaching of Miyoshi et al. disadvantageously increases the size of the column to such an extent that it is not able to be a minicolumn. As such, Applicants respectfully submit that claim 11 is patentable over Miyoshi et al. in view of Ito et al and further in view of Matsui et al.

Regarding claim 19: Claim 19 depends from claim 18, and Applicants respectfully submit that, as has been discussed above with respect to claim 18, neither Miyoshi et al. nor Ito et al. teaches or suggests in any manner whatsoever a mini-environment capable of housing and isolating a plurality of minicolumns. In addition, Applicants respectfully submit that, referring to FIGs. 4, 6-7, 9 and 11 of Matsui et al., Matsui et al. also does not teach a mini-environment capable of housing and isolating a plurality of minicolumns. In further addition, Applicants respectfully submit that there is no teaching, hint, or suggestion of any kind whatsoever in Miyoshi et al., in Ito et al. or in Matsui et al. or anywhere to utilize a mini-environment having an opening for introducing and extracting a plurality of minicolumns into and from a main chamber, respectively, as required by claim 19.

Lastly, Applicants respectfully submit that there is no reason, suggestion, or motivation in Miyoshi et al. or in Ito et al. or in Matsui et al. or anywhere else that would have led one of ordinary skill in the art to combine Miyoshi et al. and Ito et al. and Matsui et al. to provide the invention of claim 19. As evidence of a motivation to combine Miyoshi et al. and Ito et al. and Matsui et al., the Examiner stated: "It would have been obvious to an ordinary artisan to incorporate the teachings of Matsui et al. into the obvious combination of Miyoshi et al. and Ito et al. since Matsui et al. teaches the ability of monitoring the localized processes." Applicants respectfully submit that the Examiner's assertion that one of ordinary skill in the art would combine these three references is incorrect because there is no motivation to do so, and that the Examiner's assertion is merely based upon improper hindsight. However, Applicants respectfully submit that, even if Miyoshi et al. and Ito et al. and Matsui et al. were combined in the manner set forth by the Examiner, one would not have the invention of claim 19 since there is no teaching in Miyoshi et al. or in Ito et al. or in Matsui et al. or anywhere for using a mini-environment as set forth in claim 19.

As such, Applicants respectfully submit that claim 19 is patentable over Miyoshi et al. in view of Ito et al and further in view of Matsui et al.

Regarding claim 20: Claim 20 depends from claim 18, and Applicants respectfully submit that, as has been discussed above with respect to claim 18, neither Miyoshi et al. nor Ito et al. teaches or suggests in any manner whatsoever a mini-environment capable of housing and isolating a plurality of minicolumns. In addition, Applicants respectfully submit that, referring to FIGs. 4, 6-7, 9 and 11 of Matsui et al., Matsui et al. also does not teach a mini-environment capable of housing and isolating a plurality of minicolumns. In further addition, Applicants respectfully submit that there is no teaching, hint, or suggestion of any kind whatsoever in Miyoshi et al., in Ito et al. or in Matsui et al. or anywhere to utilize mini-environment having an opening for introducing and extracting a minicolumn into and from a main chamber, respectively, as required by claim 20. In further addition, Applicants respectfully submit that although Matsui et al. teaches the use of a bellows to attach an SEM tube to a flange mounted at an opening of a vacuum wall, this provides no teaching or suggestion for a mini-environment that uses a bellows structure for introducing and extracting a plurality of minicolumns into and from a main chamber, respectively, as required by claim 20. In particular, this is the case because there is no teaching or suggestion in Miyoshi et al., in Ito et al. or in Matsui et al. to house a plurality of minicolumns in a mini-environment.

Lastly, Applicants respectfully submit that there is no reason, suggestion, or motivation in Miyoshi et al. or in Ito et al. or in Matsui et al. or anywhere else that would have led one of ordinary skill in the art to combine Miyoshi et al. and Ito et al. and Matsui et al. to provide the invention of claim 20. As evidence of a motivation to combine Miyoshi et al. and Ito et al. and Matsui et al., the Examiner stated: "It would have been obvious to an ordinary artisan to incorporate the teachings of Matsui et al. into the obvious combination of Miyoshi et al. and Ito et al. since Matsui et al. teaches the ability of monitoring the localized processes." Applicants respectfully submit that the Examiner's assertion that one of ordinary skill in the art would combine these three references is incorrect because there is no motivation to do so, and that the Examiner's assertion is merely based upon improper hindsight. However, Applicants respectfully submit that, even if Miyoshi et al. and Ito et al. and Matsui et al. were combined in

the manner set forth by the Examiner, one would not have the invention of claim 20 since there is no teaching in Miyoshi et al. or Ito et al. or Matsui et al. or anywhere for using a mini-environment as set forth in claim 20.

As such, Applicants respectfully submit that claim 20 is patentable over Miyoshi et al. in view of Ito et al and further in view of Matsui et al.

Regarding claim 22: Claim 22 depends from claim 21, and Applicants respectfully submit that, as has been discussed above with respect to claim 21, neither Miyoshi et al. nor Ito et al. teaches or suggests that each of the minicolumns has a lens arrangement consisting essentially of a plurality of conducting electrodes and at least one insulator interposed between said conducting electrodes, and wherein said lens arrangement is of a diameter no larger than three centimeters and height of no more than one centimeter. In addition, Applicants respectfully submit that Matsui et al. also teaches away from claim 22 by teaching the use of a movable column, see Matsui et al. at col. 12, lines 37-50.

Lastly, Applicants respectfully submit that Matsui et al. does not teach minicolumns as required by claim 22 since Matsui et al. teaches a SEM tube having a length of 100 mm (see Matsui et al. at col. 6, lines 8-28).

As such, Applicants respectfully submit that claim 22 is patentable over Miyoshi et al. in view of Ito et al and further in view of Matsui et al.

Regarding claim 23: Applicants respectfully submit that claim 23 depends from claim 22, and as such, Applicants respectfully submit that claim 23 is patentable over Miyoshi et al. in view of Ito et al. and further in view of Matsui et al. for the same reasons set forth above with respect to claim 22. As such, Applicants respectfully submit that claim 23 is patentable over Miyoshi et al. in view of Ito et al and further in view of Matsui et al.

In light of the above, Applicants respectfully request that the Examiner withdraw this rejection.

Examiner rejected claims 1, 4 and 27-28 under 35 U.S.C. 103(a). In particular, the Examiner stated:

Claims 1, 4 and 27-28 are rejected under 35 U.S.C. 103(a) as unpatentable over US Pat No 4,864,228 issued to Richardson and in view of US Pat No 5,502,306 issued to Meisburger et al.

Richardson teaches an electron microscope having a main vacuum chamber (192) housing a stage (194) therein and connected to a vacuum pump (col. 20, lines 14-18).

Richardson teaches a mini-column (187) and a mini-environment (190) housing said mini-column (187) (see fig. 12).

Richardson does not explicitly teach a load lock for loading a specimen into said main chamber.

However, Meisburger et al. teaches a load lock (224,226) for loading a specimen (57) into a main vacuum chamber (206) housing a stage (24) (col. 16, lines 4-20; see fig. 8).

It would have been obvious to an ordinary artisan to incorporate the teachings of Meisburger et al. into Richardson since Meisburger et al teaches time-efficiency (col. 4, lines 56-58; col. 3, lines 1-5; col. 16, lines 11-15).

As per claim 4, Richardson teaches a mini-environment (190) having an evaluation means (col. 20, lines 34-47).

As per claims 27-28, Richardson teaches a back plate, which fixes the x and y mechanisms attached/connected to mini-column (187) (fig. 12).

Applicants have amended claim 1 to clarify language, to define the present invention more clearly, and to correct inadvertent errors. As such, Applicants respectfully traverse the Examiner's rejection.

Regarding claim 1: Note that claim 1 has been amended to make clear that a mini-environment is capable of housing and isolating a minicolumn.

The Examiner has asserted that Richardson teaches a minicolumn disposed inside a mini-environment. As support for this assertion the Examiner points to FIG. 12 and col. 20, lines 14-18 of Richardson. Applicants respectfully submit that the Examiner is wrong, and that Richardson does not teach, hint, or suggest a mini-environment capable of housing and isolating a minicolumn. In particular, the specification defines a minicolumn at p. 2, line 10 to p. 3, line 5 in conjunction with FIG. 2 as including an electron source, an aperture, and lens arrangements having a diameter and height measured in single-digit centimeters. There is nothing at all in Richardson that indicates that electron beam column 187 shown in FIG. 12 is a minicolumn or that even describes its size. As such, the Examiner's assertion that electron beam column 187 is a minicolumn is not based on any evidence. In addition, there is nothing in FIG. 12 or in

Richardson that indicates the existence of a mini-environment capable of housing and isolating the minicolumn from the main chamber. As such, Richardson does not teach, hint or suggest a minicolumn or a mini-environment.

Further, even if one were to combine the teaching of Meisburger et al. to add a load lock to the teaching of Richardson, one would still not arrive at the invention of claim 1 since there is no teaching, hint, or suggestion in either Richardson or in Meisburger et al. for using a mini-environment capable of housing and isolating a minicolumn.

Lastly, Applicants respectfully submit that there is no reason, suggestion, or motivation in Richardson or in Meisburger et al. or anywhere else that would have led one of ordinary skill in the art to combine Richardson and Meisburger et al. to provide the invention of claim 1. As evidence of a motivation to combine Richardson and Meisburger et al., the Examiner stated: "It would have been obvious to an ordinary artisan to incorporate the teachings of Meisburger et al. into Richardson since Meisburger et al. teaches time-efficiency." Applicants respectfully submit that, even if Richardson and Meisburger et al. were combined in the manner set forth by the Examiner, one would not have the invention of claim 1 since there is no teaching in Richardson or Meisburger et al. or anywhere for using a mini-environment as set forth in claim 1.

As such, Applicants respectfully submit that claim 1 is patentable over Richardson in view of Meisburger et al.

Regarding claim 4: Applicants respectfully submit that claim 4 depends from claim 1, and as such, Applicant respectfully submits that claim 4 is patentable over Richardson in view of Meisburger for the reasons set forth above with respect to claim 1.

In addition, claim 4 requires that the mini-environment have an evacuation outlet. Applicants respectfully submit that there is nothing in Richardson that describes an evacuation outlet, or an evacuation outlet in conjunction with FIG. 12.

As such, Applicants respectfully submit that claim 4 is patentable over Richardson in view of Meisburger et al.

Regarding claim 27: Applicants respectfully submit that claim 27 depends from claim 1, and as such, Applicant respectfully submits that claim 27 is patentable over Richardson in view of Meisburger for the reasons set forth above with respect to claim 1.

In addition, claim 27 requires a mini-environment that comprises a back plate. Applicants respectfully submit that there is nothing in Richardson that describes a back plate, or a back plate in conjunction with FIG. 12. FIG. 12 shows x and y mechanisms that rest on a ledge. However, such a ledge cannot be a back plate of a mini-environment since the column extends beyond the ledge.

As such, Applicants respectfully submit that claim 27 is patentable over Richardson in view of Meisburger et al.

Regarding claim 28: Applicants respectfully submit that claim 28 depends from claims 1 and 27, and as such, Applicant respectfully submits that claim 28 is patentable over Richardson in view of Meisburger for the reasons set forth above with respect to claims 1 and 27.

As such, Applicants respectfully submit that claim 28 is patentable over Richardson in view of Meisburger et al.

In light of the above, Applicants respectfully request that the Examiner withdraw this rejection.

Examiner rejected claims 12-17 and 24-26 under 35 U.S.C. 103(a). In particular, the Examiner stated:

Claims 12-17 and 24-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Pat No 5,229,607 issued to Matsui et al. and US Pat No 4,058,731 issued to Muller et al.

Matsui et al teaches a main vacuum chamber (17) connected to a vacuum pump (21,22) (col. 8, lines 14-25) and housing an X-Y-Z stage (4) (col. 5, lines 4-7); a holding arm (2) (see Fig. 9; col. 11, lines 50-59); a minicolumn (1) attached to said holding arm.

Matsui et al. does not teach a turntable. However, Muller et al. teaches a turntable (2) (col. 5, lines 4-7).

It would have been obvious to an ordinary artisan to incorporate the teachings of Muller et al. into Matsui et al. since Muller et al. teaches the improvement of controlling rotational movement in angular increment (i.e. increased control) (col. 2, lines 4-25).

As per claim 13, Matsui et al. teaches a radial pivot (227,228) (see col. 11, lines 51-56).

As per claim 24, Matsui et al. teaches a mini-column attached to a holding arm structure (col. 11, lines 50-59). Matsui et al. also teaches a plurality of mini-columns.

Matsui does not explicitly teach a plurality of mini-columns attached to said holding arm structure.

However, an ordinary artisan would have found it obvious to extend the holding arm structure depicted in fig. 9 to accommodate the additional SEM tube shown in fig. 11 since Matsui et al. teaches arranging said minicolumn(s) along a circular arc (col. 12, lines 51-59).

Applicants have canceled claim 12 and amended claims 13-15, and 24 to clarify language, to define the present invention more clearly, and to correct inadvertent errors. As such, Applicants respectfully traverse the Examiner's rejection.

Regarding claim 13: Note that claim 13 depends from claim 7 which has been amended to include a turntable stage, a mounting arm inside a vacuum chamber, the mounting arm having a motion mechanism imparting one of rotational or linear translational motion to the mounting arm, and a minicolumn non-translatably mounted on the mounting arm inside the vacuum chamber.

Applicants respectfully submit that there is no reason, suggestion, or motivation in Matsui et al. or in Muller et al. or anywhere else that would have led one of ordinary skill in the art to combine Matsui et al. and Muller et al. to provide the invention of claim 13. As evidence of a motivation to combine Matsui et al. and Muller et al., the Examiner stated: "It would have been obvious to an ordinary artisan to incorporate the teachings of Muller et al. into Matsui et al. since Muller et al. teaches the improvement of controlling rotational movement in angular increment (i.e., increased control)." However, Applicants respectfully submit that the teaching of Muller et al. that the Examiner shows as evidence of a motivation to combine Matsui et al. and Muller et al. merely relates to improvements in controlling rotational movement of a prior art specimen holder that also has two degrees of freedom of translation. Such a specimen holder is not disclosed in Matsui et al. As such, the Examiner's evidence cannot provide a motivation to combine Matsui et al. and Muller et al. Hence, Applicants respectfully submit that the Examiner is wrong in asserting that the teaching of Muller et al. is motivation to replace the translatable stage of Matsui et al. with a rotational one. In fact, Applicants respectfully submit that the

Examiner's assertion of evidence of a teaching, suggestion or motivation to combine Matsui et al. and Muller et al. is improperly based on hindsight, albeit incorrect hindsight.

As such, Applicants respectfully submit that claim 13 is patentable over Matsui et al. in view of Muller et al.

Regarding claim 14: Note that claim 14, like claim 13, depends from claim 7, and as such, Applicants respectfully submit that claim 14 is patentable over Matsui et al. in view of Muller et al. for the same reasons set forth above with respect to claim 13. In addition, Applicants respectfully submit that neither Matsui et al. nor Muller et al. teach or suggest a minicolumn non-translatably mounted on the mounting arm which is connected to a linear motion carriage as required by claim 14.

As such, Applicants respectfully submit that claim 14 is patentable over Matsui et al. in view of Muller et al.

Regarding claim 15: Note that claim 15, like claim 13, depends from claim 7, and as such, Applicants respectfully submit that claim 15 is patentable over Matsui et al. in view of Muller et al. for the same reasons set forth above with respect to claim 13.

In addition, Applicants respectfully submit that neither Matsui et al. nor Muller et al. teach or suggest at least one additional minicolumn connected to the movable mounting arm as required by claim 15. Applicants respectfully submit that neither Matsui et al. nor Muller et al. teach, hint or suggest having at least two minicolumns connected to a movable mounting arm. In fact, when Matsui et al. discloses multiple SEM tubes arranged along a circular arc (see col. 12, lines 58-64), there is no hint or suggestion that they are connected to a movable mounting arm as required by claim 15.

As such, Applicants respectfully submit that claim 15 is patentable over Matsui et al. in view of Muller et al.

Regarding claim 16: Note that claim 16 depends from claim 15, and that claim 15, like claim 13, depends from claim 7. As such, Applicants respectfully submit that claim 16 is patentable over Matsui et al. in view of Muller et al. for the same reasons set forth above with respect to claims 13 and 15.

In addition, Applicants respectfully submit that neither Matsui et al. nor Muller et al. teach or suggest at least one additional minicolumn connected to the movable mounting arm that has a tilt as required by claim 16. Applicants respectfully submit that neither Matsui et al. teach, hint or suggest having at least two minicolumns connected to a movable mounting arm wherein at least one has a tilt. In fact, when Matsui et al. discloses multiple SEM tubes arranged along a circular arc (see col. 12, lines 58-64), there is no hint or suggestion that they are connected to a movable mounting arm as required by claim 16.

As such, Applicants respectfully submit that claim 16 is patentable over Matsui et al. in view of Muller et al.

Regarding claim 17: Note that claim 17 depends from claims 15 and 16, and that claims 15 and 16, like claim 13, depend from claim 7. As such, Applicants respectfully submit that claim 17 is patentable over Matsui et al. in view of Muller et al. for the same reasons set forth above with respect to claims 13, 15 and 16.

In addition, Applicants respectfully submit that neither Matsui et al. nor Muller et al. teach or suggest at least one additional minicolumn connected to the movable mounting arm that has a variable tilt as required by claim 17. Applicants respectfully submit that neither Matsui et al. nor Muller et al. teach, hint or suggest having at least two minicolumns connected to a movable mounting arm wherein at least one has a variable tilt. In fact, when Matsui et al. discloses multiple SEM tubes arranged along a circular arc (see col. 12, lines 58-64), there is no hint or suggestion that they are connected to a movable mounting arm as required by claim 17, or that at least one has a variable tilt.

As such, Applicants respectfully submit that claim 17 is patentable over Matsui et al. in view of Muller et al.

Regarding claim 24: Note that claim 24 has been amended like claim 7 discussed above to include a turntable stage, a holding arm inside a vacuum chamber, the holding arm having a motion mechanism imparting one of rotational or linear translational motion to the holding arm, and a plurality of minicolumns non-translatably mounted on the holding arm.

Applicants respectfully submit that neither Matsui et al. nor Muller et al. teach or suggest a plurality of minicolumns being connected to a movable holding arm as required by

claim 24. In fact, when Matsui et al. discloses multiple SEM tubes arranged along a circular arc (see col. 12, lines 58-64), there is no hint or suggestion that they are connected to a movable holding arm as required by claim 24.

In addition, Applicants respectfully submit that there is no reason, suggestion, or motivation in Matsui et al. or in Muller et al. or anywhere else that would have led one of ordinary skill in the art to combine Matsui et al. and Muller et al. to provide the invention of claim 24. As evidence of a motivation to combine Matsui et al. and Muller et al., the Examiner stated: "However, an ordinary artisan would have found it obvious to extend the holding arm structure depicted in fig. 9 to accommodate the additional SEM tube shown in fig. 11 since Matsui et al. teaches arranging said minicolumn(s) along a circular arc." Applicants respectfully submit the Examiner is wrong in providing such evidence since fig. 11 actually teaches away by showing the chamber to be filled with SEM tubes with no room for movement. In addition, Applicants respectfully submit that the Examiner's assertion of evidence of a teaching, suggestion or motivation to combine Matsui et al. and Muller et al. is improperly based on hindsight.

As such, Applicants respectfully submit that claim 24 is patentable over Matsui et al. in view of Muller et al.

Regarding claims 25-26: Note that claims 25 and 26 are patentable over Matsui et al. and Muller et al. for substantially the same reasons set forth above with respect to claims 16 and 17.

In light of the above, Applicants respectfully request that the Examiner withdraw this rejection.

Examiner rejected claims 7, 9-10, and 31-32 under 35 U.S.C. 103(a). In particular, the Examiner stated:

Claims 7, 9-10 and 31-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Pat No 5,229,607 issued to Matsui et al. and in view of Ito et al.

Matsui et al. teaches a main vacuum chamber (204) housing a stage (4) therein (col. 12, lines 51-64) and connected to a vacuum (col. 11, lines 45-50).

Matsui et al. teaches a minicolumn non-translatably positioned inside said main chamber (col. 12, lines 51-64; see fig. 11).

Matsui et al. does not explicitly teach a load lock. However, Ito et al. teaches a main vacuum chamber (14) housing stage (20) therein and connected to a vacuum pump (see fig. 2).

Ito et al. discloses a load lock (18) for loading a specimen into said chamber (see abstract).

It would have been obvious to an ordinary artisan to incorporate the teachings of Ito et al. into Matsui et al. since Ito et al. teaches the ability to easily obtain an SEM image of a cut face of a sample (see abstract).

As per claims 9 and 31-32, Matsui et al. teaches at least one tilted minicolumn (1-1) situated inside said main chamber (204) at a tilt angle with respect to a perpendicular to a surface of the stage (4) (col. 12, lines 58-63).

As per claim 10, Matsui et al. teaches tilting said minicolumn about a circular arc without a definite tilt by assumes a variable tilt with respect to one another (col. 12, lines 58-62).

Applicants have amended claims 7 and 9-10 to clarify language, to define the present invention more clearly, and to correct inadvertent errors. As such, Applicants respectfully traverse the Examiner's rejection.

Regarding claim 7: Note that claim 7 has been amended to include a turntable stage, a mounting arm inside a vacuum chamber, the mounting arm having a motion mechanism imparting one of rotational or linear translational motion to the mounting arm, and a minicolumn non-translatably mounted on the mounting arm inside the vacuum chamber.

Applicants respectfully submit that neither Matsui et al. nor Ito et al. teaches a turntable stage, a mounting arm inside a vacuum chamber, the mounting arm having a motion mechanism imparting one of rotational or linear translational motion to the mounting arm, and a minicolumn non-translatably mounted on the mounting arm inside the vacuum chamber as required by claim 7.

As such, Applicants respectfully submit that claim 7 is patentable over Matsui et al. in view of Ito et al.

Regarding claim 9: Claim 9 depends from claim 7, and as such, Applicants respectfully submit that claim 9 is patentable over Matsui et al. in view of Ito et al. for the same reasons set forth above with respect to claim 7.

As such, Applicants respectfully submit that claim 9 is patentable over Matsui et al. in view of Ito et al.

Regarding claim 10: Claim 10 depends from claims 7 and 9, and as such, Applicants respectfully submit that claim 10 is patentable over Matsui et al. in view of Ito et al. for the same reasons set forth above with respect to claims 7 and 9.

As such, Applicants respectfully submit that claim 10 is patentable over Matsui et al. in view of Ito et al.

Regarding claim 31: Claim 31 depends from claim 7, and as such, Applicants respectfully submit that claim 31 is patentable over Matsui et al. in view of Ito et al. for the same reasons set forth above with respect to claim 7.

As such, Applicants respectfully submit that claim 31 is patentable over Matsui et al. in view of Ito et al.

Regarding claim 32: Claim 32 depends from claims 7 and 31, and as such, Applicants respectfully submit that claim 32 is patentable over Matsui et al. in view of Ito et al. for the same reasons set forth above with respect to claims 7 and 31.

As such, Applicants respectfully submit that claim 32 is patentable over Matsui et al. in view of Ito et al.

In light of the above, Applicants respectfully request that the Examiner withdraw this rejection.

Examiner rejected claims 7 and 9-10 under 35 U.S.C. 103(a). In particular, the Examiner stated:

Claims 7 and 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsui et al. '607 and US Pat No 5,502,306 issued to Meisburger et al.

Matsui et al teaches a main vacuum chamber (204) housing a stage (4) therein (col. 12, lines 51-64) and connected to a vacuum (col. 11, lines 45-50).

Matsui et al. teaches a minicolumn non-translatably positioned inside said main chamber (col. 12, lines 51-64; see fig. 11).

Matsui et al. does not explicitly teach a load lock however Meisburger et al. teaches a load lock.

It would have been obvious to an ordinary artisan to incorporate the teachings of Meisburger et al. into Matsui et al. since Meisburger et al. teaches time-efficiency (col. 4, lines 56-58; col. 3, lines 1-5; col. 16, lines 11-15).

Applicants have amended claims 7 and 9-10 to clarify language, to define the present invention more clearly, and to correct inadvertent errors. As such, Applicants respectfully traverse the Examiner's rejection.

Regarding claim 7: Note that claim 7 has been amended to include a turntable stage, a mounting arm inside a vacuum chamber, the mounting arm having a motion mechanism imparting one of rotational or linear translational motion to the mounting arm, and a minicolumn non-translatably mounted on the mounting arm inside the vacuum chamber.

Applicants respectfully submit that neither Matsui et al. nor Meisburger et al. teaches a turntable stage, a mounting arm inside a vacuum chamber, the mounting arm having a motion mechanism imparting one of rotational or linear translational motion to the mounting arm, and a minicolumn non-translatably mounted on the mounting arm inside the vacuum chamber as required by claim 7.

As such, Applicants respectfully submit that claim 7 is patentable over Matsui et al. in view of Meisburger et al.

Regarding claim 9: Claim 9 depends from claim 7, and as such, Applicants respectfully submit that claim 9 is patentable over Matsui et al. in view of Meisburger et al. for the same reasons set forth above with respect to claim 7.

As such, Applicants respectfully submit that claim 9 is patentable over Matsui et al. in view of Meisburger et al.

Regarding claim 10: Claim 10 depends from claims 7 and 9, and as such, Applicants respectfully submit that claim 10 is patentable over Matsui et al. in view of Meisburger et al. for the same reasons set forth above with respect to claims 7 and 9.

As such, Applicants respectfully submit that claim 10 is patentable over Matsui et al. in view of Meisburger et al.

In light of the above, Applicants respectfully request that the Examiner withdraw this rejection.

Examiner stated:

Applicants' arguments filed 12/10/02 have been fully considered but they are not persuasive. Applicant contends that Miyoshi et al. does not teach a minicolumn or a mini-environment that houses a minicolumn.

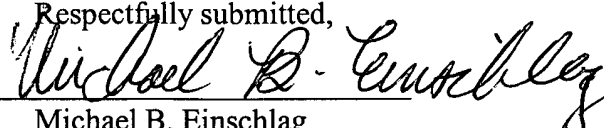
Contrarily, as stated in the office action mailed on 6-5-02, Miyoshi et al. teaches a mini-environment defined in the case (10a), wherein said case (10a) houses the electron gun (21), an aperture (26a), and lens arrangement (22) within said mini-environment (col. 4, lines 33-44). Miyoshi et al. teaches creating said mini-environment by employing a vacuum pump (col. 3, lines 51-66; col. 6, lines 14-30).

Therefore, Miyoshi et al. does disclose a minicolumn (10) housed within a mini-environment as recited.

Applicants believe the Examiner is incorrect when the Examiner asserts that Miyoshi et al. discloses a minicolumn housed within a mini-environment for the reasons set forth above in responding to the rejections.

Applicants have added new claim 33, and Applicants respectfully submit that claim 33 is patentable over the cited art for the reasons discussed above in responding to the rejections.

In light of the above, Applicants respectfully submit that all the remaining claims are allowable, and Applicants respectfully request that the Examiner reconsider the case and pass the case to issue. Should the Examiner have any questions or wish to discuss any aspect of the application, a telephone call to the undersigned would be welcome.

Respectfully submitted,
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